

PATENT ABSTRACTS OF JAPAN

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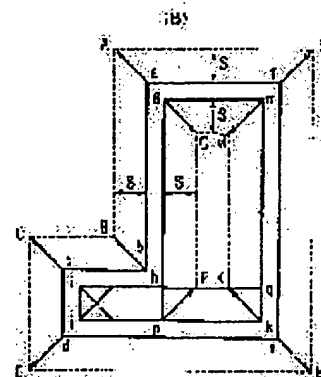
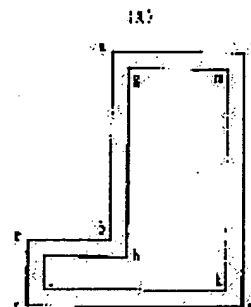
TAWARA KATSUJI

(54) SIZING PROCESS METHOD

(57)Abstract:

PURPOSE: To perform a correct sizing process in a shorter time.

CONSTITUTION: When the correct sizing process is performed, sides gh and ih having a vertex (h) of 90° in external angle at one end are extended from the one end (h), an internal side pattern ghijklm is divided into a rectangular pattern gpkm and a rectangular pattern ijkl, and the rectangular pattern ijkl whose short-side half value L is less than a sizing quantity S is excluded; and the sizing process whose sizing quantity is -S is performed for the rectangular pattern qpkm whose short-side half value L is larger than the sizing quantity S to obtain a rectangular pattern GPKM, and graphic OR GPKM between the rectangular patterns after the sizing process is regarded as an internal side pattern after the sizing process. Only the internal side pattern is divided into the rectangular patterns and the sizing process is only performed for the rectangular patterns and an external side pattern; and the process when the rectangular patterns disappear by the sizing process, is simplified.



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3181372

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20.04.2001

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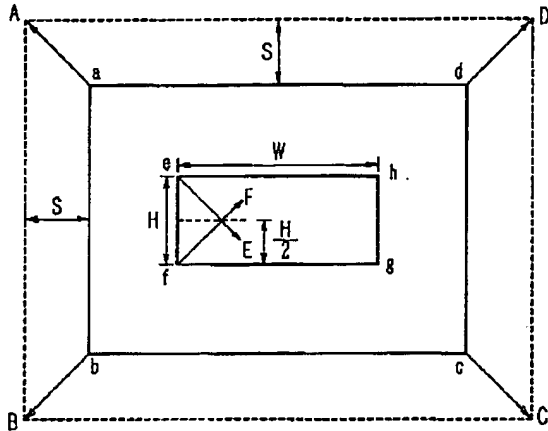
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DRAWINGS

[Drawing 1]

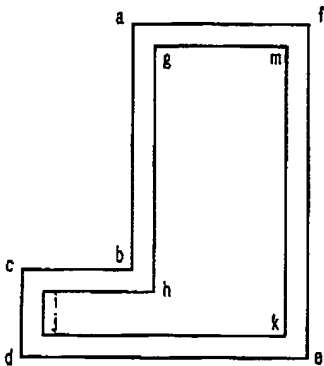
本発明のサイジング処理方法



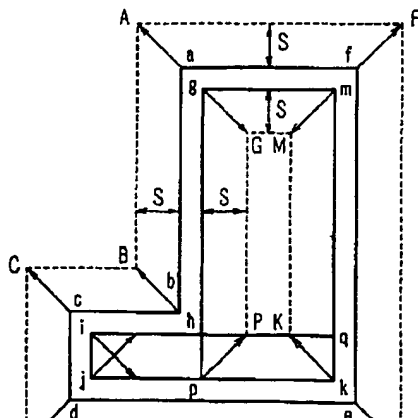
[Drawing 2]

本発明のサイジング処理方法

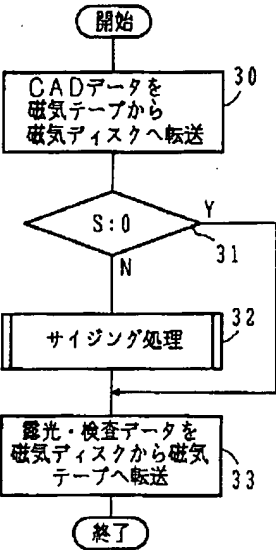
(A)



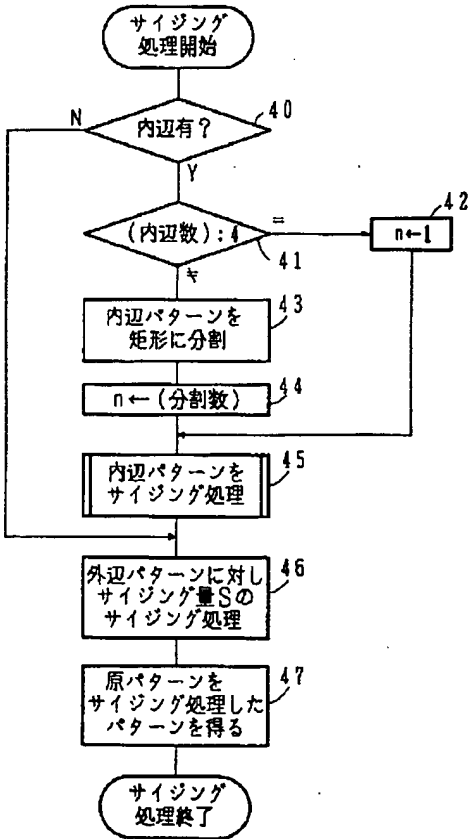
(B)



[Drawing 3]
サイジング処理手順

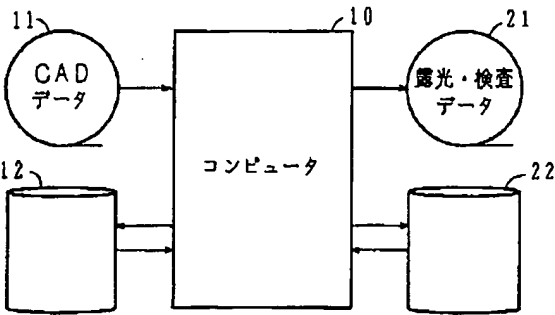


[Drawing 4]
図3のステップ32での1個のパターンに対する正の
サイジング処理の詳細



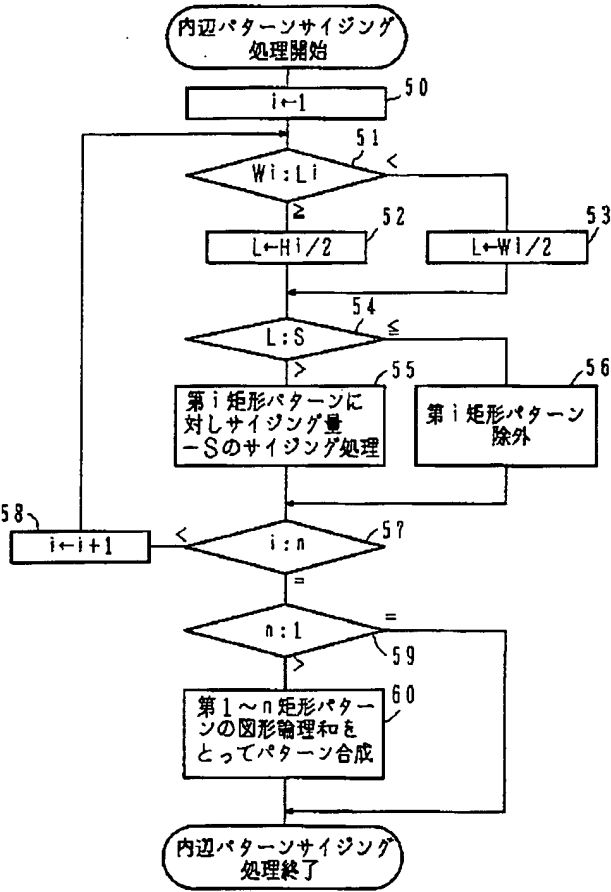
[Drawing 6]

アートワーク処理装置



[Drawing 5]

図4のステップ45の詳細

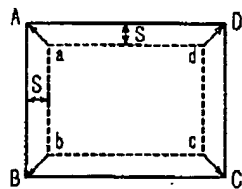
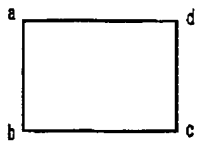


[Drawing 7]

従来のサイジング処理

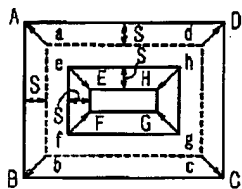
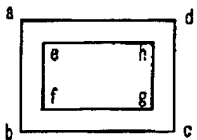
(A1)

(B1)



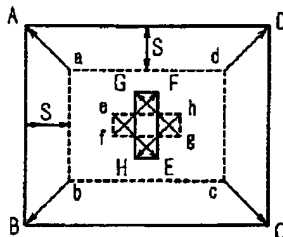
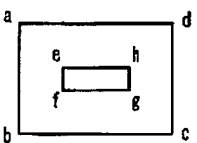
(A2)

(B2)



(A3)

(B3)

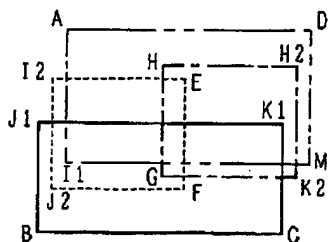
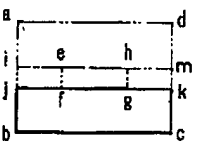


[Drawing 8]

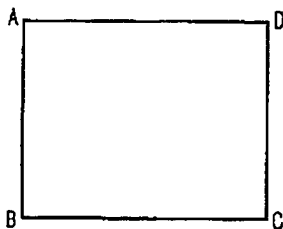
従来のサイジング処理

(A)

(B)



(C)



[Translation done.]

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PRIOR ART

[Description of the Prior Art] When the amount S of sizing is positive by the rectangle pattern abcd as a original pattern shows to drawing 7 (A1), sizing processing to the CAD data of a mask pattern is performed, when only the amount S of sizing makes the parallel displacement of each sides AB, BC, CD, and DA carry out outside and only the amount S of sizing makes the ends of each side extend as shown in (B1). The rectangle pattern ABCD fattened by this sizing processing, without moving a center is obtained.

[0003] Like drawing 7 (A2), when a original pattern is a rectangle pattern without inside, by moreover, the case where it is the pattern of the configuration which sampled the inner side pattern efgh from the outside side pattern abcd When the amount S of sizing is positive, the above-mentioned processing is performed to the outside side pattern abcd, the outside side pattern ABCD is obtained, and the amount of sizing to the inner side pattern efgh - The same processing as the above at the time of being S is performed, and the inner side pattern EFGH is obtained.

[0004] However, if the above-mentioned sizing processing is performed as a pattern turns minutely, for example, it is shown to the original pattern of drawing 7 (A3) (B3) with high integration of a semiconductor integrated circuit, the inner side pattern efgh which should originally disappear will appear as an inner side pattern GHEF.

[0005] In order to avoid such incorrect processing, as the former shows to drawing 8 (A) (1) Four rectangle patterns aimd and jbck which do not have inside omission in a original pattern Divide into ijfe and hgkm and the above-mentioned sizing processing is performed to each rectangle pattern by which (2) division was carried out. four rectangle pattern AI1MD as shown in (B), J1BCK1, I2J2FE, and HGK2H2 -- obtaining -- (3) -- the rectangle pattern ABCD with which the omission pattern disappeared inside, as figure OR operation is performed to these rectangle patterns and it is shown in (C) had been obtained

[0006] If it does in this way, the right sizing processing can be performed also to an inside omission pattern.

[0007] In addition, in order to avoid confusion, each rectangle pattern of each other is shifted a little, and is expressed with drawing 8 (B) so that the side of each rectangle pattern may not lap.

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EFFECT OF THE INVENTION

[Effect of the Invention] Since processing in case this rectangle pattern disappears by sizing processing becomes easy that what is necessary is to divide only an inner side pattern into a rectangle pattern, and just to perform sizing processing to this rectangle pattern and an outside side pattern according to the sizing art concerning this invention as explained above, the outstanding effect that the right sizing processing can be performed more in a short time is done so.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, since the number of patterns of a sizing processing object increases to the top where the number of original patterns of a sizing processing object is huge sharply by division of an inside omission pattern, long time-ization of sizing processing becomes remarkable. If sizing processing as shown in drawing 7 (B3) is performed in order to avoid this, the pattern which is not desirable will be obtained.

[0009] The purpose of this invention is to offer the sizing art which can perform the right sizing processing more in a short time in view of such a trouble.

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OPERATION

[Means for Solving the Problem and its Function] Drawing 1 and drawing 2 are explanatory drawings of the sizing art concerning this invention.

[0011] this -- sizing -- an art -- a mask pattern -- CAD -- data -- containing -- having -- **** -- outside -- the side -- a pattern -- from -- inner -- the side -- a pattern -- having sampled -- a configuration -- original -- a pattern -- receiving -- outside -- the side -- an outside -- and -- inner -- the side -- the inside -- width of face -- S -- only -- this -- original -- a pattern -- growing fat -- making -- ** -- saying -- sizing -- an amount -- S -- positive -- This original pattern is a pattern of the configuration which sampled the inner side pattern ghijklm from the outside side pattern abcdef as shown in the pattern of the configuration which sampled the inner side pattern efgh from the outside side pattern abcd as shown in drawing 1 (A), or drawing 2 (A).

[0012] (1) When a 90-degree exterior angle is in this inner side pattern, an exterior angle makes the side which uses as an end the peak which is 90 degrees extend from this end, and divides this inner side pattern into the 1st - the n-th rectangle pattern.

[0013] For example, when a original pattern is drawing 2 (A), as shown in drawing 2 (B), an exterior angle makes the side gh and the side ih which use as an end the peak h which is 90 degrees extend from this end h, and divides the inner side pattern ghijklm into the 1st rectangle pattern gpkm and the 2nd rectangle pattern ijkq.

[0014] (2) the case where the half the price L of a shorter side is below the amount S of sizing about this inner side pattern efgh that is each of this 1st-n-th rectangle pattern, or a rectangle pattern, for example, the inner side pattern of drawing 1, -- this rectangle pattern -- excepting -- the half the price L of a shorter side -- the amount left hand lay of sizing -- in being large, the amount of sizing that only width of face S dwindles this rectangle pattern to the neighboring inside performs sizing processing of -S to this rectangle pattern

[0015] For example, in drawing 2 (B), the 2nd rectangle pattern ijkq whose half the price L of a shorter side is below the amount S of sizing is excepted, to the larger 1st rectangle pattern qpkm than the amount S of sizing, the amount of sizing performs sizing processing of -S, and the half the price L of a shorter side obtains the rectangle pattern GPKM.

[0016] (3) When a 90-degree exterior angle is in this inner side pattern, let the figure OR between these 1st-n-th rectangle patterns by which sizing processing was carried out be the inner side pattern by which sizing processing was carried out.

[0017] For example, let Pattern GPKM be the inner side pattern by which sizing processing was carried out in drawing 2 (B).

[0018] (4) Perform sizing processing of the amount S of sizing to the side pattern outside this.

[0019] For example, in drawing 2 (B), Pattern ABCDEF is obtained by performing sizing processing of the amount S of sizing to the outside side pattern abcdef.

[0020] (5) Let the pattern of the configuration which sampled this inner side pattern by which sizing processing was carried out from the side pattern outside this by which sizing processing was carried out be the pattern which performed sizing processing of the amount S of sizing to this original pattern.

[0021] For example, the pattern which performed sizing processing of the amount S of sizing to the original pattern of drawing 2 (A) turns into a pattern shown by the dotted line of drawing 2 (B).

[0022] In this invention, since processing in case this rectangle pattern disappears by sizing processing becomes easy that what is necessary is to divide only an inner side pattern into a rectangle pattern, and just to perform sizing processing to this rectangle pattern and an outside side pattern, the right sizing processing can be performed more in a short time.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] this invention relates to the sizing art for mask pattern CAD data performed in an artwork.

[0002]

[Description of the Prior Art] When the amount S of sizing is positive by the rectangle pattern abcd as a original pattern shows to drawing 7 (A1), sizing processing to the CAD data of a mask pattern is performed, when only the amount S of sizing makes the parallel displacement of each sides AB, BC, CD, and DA carry out outside and only the amount S of sizing makes the ends of each side extend as shown in (B1). The rectangle pattern ABCD fattened by this sizing processing, without moving a center is obtained.

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[0008]

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[0009] The purpose of this invention is to offer the sizing art which can perform the right sizing processing more in a short time in view of such a trouble.

[0010]

[Means for Solving the Problem and its Function] Drawing 1 and drawing 2 are explanatory drawings of the sizing art concerning this invention.

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[0013] For example, when a original pattern is drawing 2 (A), as shown in drawing 2 (B), an exterior angle makes the side gh and the side ih which use as an end the peak h which is 90 degrees extend from this end h, and divides the inner side pattern ghijk into the 1st rectangle pattern gpk and the 2nd rectangle pattern ijkg.

[0014] (2) the case where the half the price L of a shorter side is below the amount S of sizing about this inner side pattern efgh that is each of this 1st-n-th rectangle pattern, or a rectangle pattern, for example, the inner side pattern of drawing 1, -- this rectangle pattern -- excepting -- the half the price L of a shorter side -- the amount left hand lay of sizing -- in being large, the amount of sizing that only width of face S dwindles this rectangle pattern to the neighboring inside performs sizing processing of -S to this rectangle pattern

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[0021] For example, the pattern which performed sizing processing of the amount S of sizing to the original pattern of drawing 2 (A) turns into a pattern shown by the dotted line of drawing 2 (B).

[0022] In this invention, since processing in case this rectangle pattern disappears by sizing processing becomes easy that what is necessary is to divide only an inner side pattern into a rectangle pattern, and just to perform sizing processing to this rectangle pattern and an outside side pattern, the right sizing processing can be performed more in a short time.

[0023] [Example] Hereafter, one example of this invention is explained based on a drawing.

[0024] Drawing 6 shows the hardware outline composition of an artwork processor. As for this equipment, magnetic tapes 11 and 21 and magnetic disks 12 and 22 are connected to the computer 10. The CAD data of a mask pattern are recorded on the magnetic tape 11.

[0025] Next, the artwork processing by the computer 10 is explained based on drawing 3 - drawing 5. Hereafter, the numeric value in a parenthesis expresses the step identification number in drawing.

[0026] (30) For improvement in the speed of processing, a computer 10 reads the mask pattern CAD data of a processing object from a magnetic tape 11, and writes this in a magnetic disk 12.

[0027] (31) If it is $S \neq 0$, it will progress to the following step 32, and if it is $S = 0$, it will progress to Step 33.

[0028] (32) A computer 10 performs sizing processing as shown in drawing 4 to all the patterns of the mask pattern CAD data currently written in the magnetic disk 12, and writes the result in a magnetic disk 22.

[0029] (33) Change into the format for the object for aligners, and test equipment the mask pattern data written in the magnetic disk 22, and write this in a magnetic tape 21.

[0030] Next, the detail of the positive sizing processing ($S > 0$) to one pattern performed at the above-mentioned step 32 is explained based on drawing 4. Negative sizing processing ($S < 0$) is the same as that of the former.

[0031] (40) Judge whether there is the inner side efg h as shown in whether the original pattern for sizing is an inside omission pattern and a pattern at the inner side, for example, drawing 1. If there is the inner side, it will progress to the following step 41, and if there is nothing, it will progress to Step 46.

[0032] (41) If the number of the inner sides is 4, it will progress to the following step 42, and if larger than 4, it will progress to Step 43. Since the number of the inner sides is set to 4 when all the interior angles of an inner side pattern are 90 degrees, if an interior angle puts whether there are any things other than 90 degree in another way, it can judge whether the number of the inner sides is 4 by whether there is any 90-degree exterior angle.

[0033] (42) Substitute 1 for the number of partitions n of the pattern (inner side pattern) surrounded in the inner side, and progress to Step 45.

[0034] (43) Divide an inner side pattern into the 1st - n rectangle pattern. For example, as a original pattern shows drawing 2 (A), when it is the configuration by which the inner side pattern ghijk m was sampled from the outside side pattern abcdef, the side pattern ghijk m is divided as follows. That is, as shown in drawing 2 (B), an exterior angle makes the sides gh and ih which use as an end the peak h which is 90 degrees extend from this end h, sets an intersection with the side jk to p, sets an intersection with the side mk to q, and divides the inner side pattern ghijk m into the 1st rectangle pattern gpkm and the 2nd rectangle pattern ijkq.

[0035] (44) Substitute the number of partitions in Step 43 for n. In the case of drawing 2 (B), it is $n = 2$.

[0036] (45) Perform sizing processing as shown in drawing 5 to the inner side pattern divided into the rectangle pattern.

[0037] (46) Perform sizing processing by the conventional method to an outside side pattern. For example, if sizing processing is performed to the outside side pattern abcd shown in drawing 1, Pattern ABCD will be obtained, and Pattern ABCDEF will be obtained if sizing processing is performed to the outside side pattern abcdef shown in drawing 2 (B).

[0038] (47) Store in the predetermined field of RAM the pattern of the configuration which sampled the inner side pattern which carried out sizing processing from the outside side pattern which carried out sizing processing as a pattern which performed sizing of the amount S of sizing to the original pattern, and whenever this field fills, write the data in a magnetic disk 22.

[0039] In addition, since sizing processing of the rectangle pattern ghqm which makes the peak the point q which is not the peak of the inner side pattern ghijk m will be carried out supposing it divides the inner side pattern ghijk m into the rectangle pattern ghqm and the rectangle pattern ijkq at the above-mentioned step 43, the right sizing cannot be performed. That is, it is necessary to divide like the above-mentioned step 43.

[0040] Next, the detail of the above-mentioned step 45 is explained based on drawing 5.

[0041] (50) Substitute 1 for the discernment variable i of the above-mentioned rectangle pattern which divided the inner side pattern and was obtained.

[0042] (51-53) If the size relation between the side W_i of the i-th rectangle pattern and Length H_i is $W_i \geq H_i$, $H_i/2$ will be substituted for the shorter side half the price L, and if it is $W_i < H_i$, $W_i/2$ will be substituted for the shorter side half the price L.

[0043] (54-56) If it is $L > S$, the amount of sizing will perform sizing processing of -S by the conventional method to the i-th rectangle pattern. For example, if this sizing processing is performed to the rectangle pattern gpkm of drawing 2 (B), the rectangle pattern GPKM will be obtained.

[0044] If it is $L \leq S$, the i-th rectangle pattern will be excepted. For example, the rectangle pattern ijkq shown in drawing 2 (B) is $L \leq S$, is excepted and disappears. Condition $L \leq S$ means that a straight line eE and a straight line fF cross in drawing 1. It is a point corresponding to the points e and f of the pattern after Points E and F perform sizing processing of amount of sizing-S here to the inner side pattern efg h.

[0045] (57) If it is $i < n$, it will progress to Step 58, and if it is $i = n$, it will progress to Step 59.

[0046] (58) Increment i and return to the above-mentioned step 51.

[0047] (59) When $n = 1$, i.e., an inner side pattern, is a rectangle pattern, the sizing processing to one inner side pattern is ended, and if it is $n > 1$, it will progress to the following step 60.

[0048] (60) Obtain one inner side pattern by which sizing processing was carried out correctly by performing figure OR operation between the 1st by which sizing processing was carried out - n rectangle pattern, and carrying out pattern composition.

[0049] When sizing processing is carried out by the conventional method shown in drawing 8 to an omission pattern while it was shown in drawing 2 (A), it must extract, a pattern must be divided into six rectangle patterns, and sizing processing must be carried out to each. On the

other hand, what is necessary is to divide an inner side pattern into two rectangle patterns, and just to perform sizing processing to a total of three patterns of this rectangle pattern and an outside side pattern in this example, since only an inner side pattern is divided into a rectangle pattern. Moreover, when the rectangle pattern which divided and obtained the inner side pattern disappears by sizing processing according to this example, processing becomes easy like the above-mentioned steps 51-56.

[0050] Therefore, according to this example, the former becomes easy [sizing processing] as a whole, and the processing time can be shortened conventionally.

[0051]

[Effect of the Invention] Since processing in case this rectangle pattern disappears by sizing processing becomes easy that what is necessary is to divide only an inner side pattern into a rectangle pattern, and just to perform sizing processing to this rectangle pattern and an outside side pattern according to the sizing art concerning this invention as explained above, the outstanding effect that the right sizing processing can be performed more in a short time does so.

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TECHNICAL FIELD

[Industrial Application] this invention relates to the sizing art for mask pattern CAD data performed in an artwork.

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EXAMPLE

[Example] Hereafter, one example of this invention is explained based on a drawing.

[0024] Drawing 6 shows the hardware outline composition of an artwork processor. As for this equipment, magnetic tapes 11 and 21 and magnetic disks 12 and 22 are connected to the computer 10. The CAD data of a mask pattern are recorded on the magnetic tape 11.

[0025] Next, the artwork processing by the computer 10 is explained based on drawing 3 - drawing 5. Hereafter, the numeric value in a parenthesis expresses the step identification number in drawing.

[0026] (30) For improvement in the speed of processing, a computer 10 reads the mask pattern CAD data of a processing object from a magnetic tape 11, and writes this in a magnetic disk 12.

[0027] (31) If it is $S \neq 0$, it will progress to the following step 32, and if it is $S = 0$, it will progress to Step 33.

[0028] (32) A computer 10 performs sizing processing as shown in drawing 4 to all the patterns of the mask pattern CAD data currently written in the magnetic disk 12, and writes the result in a magnetic disk 22.

[0029] (33) Change into the format for the object for aligners, and test equipment the mask pattern data written in the magnetic disk 22, and write this in a magnetic tape 21.

[0030] Next, the detail of the positive sizing processing ($S > 0$) to one pattern performed at the above-mentioned step 32 is explained based on drawing 4. Negative sizing processing ($S < 0$) is the same as that of the former.

[0031] (40) Judge whether there is the inner side efgh as shown in whether the original pattern for sizing is an inside omission pattern and a pattern at the inner side, for example, drawing 1. If there is the inner side, it will progress to the following step 41, and if there is nothing, it will progress to Step 46.

[0032] (41) If the number of the inner sides is 4, it will progress to the following step 42, and if larger than 4, it will progress to Step 43. Since the number of the inner sides is set to 4 when all the interior angles of an inner side pattern are 90 degrees, if an interior angle puts whether there are any things other than 90 degree in another way, it can judge whether the number of the inner sides is 4 by whether there is any 90-degree exterior angle.

[0033] (42) Substitute 1 for the number of partitions n of the pattern (inner side pattern) surrounded in the inner side, and progress to Step 45.

[0034] (43) Divide an inner side pattern into the 1st - n rectangle pattern. For example, as a original pattern shows drawing 2 (A), when it is the configuration by which the inner side pattern ghijklm was sampled from the outside side pattern abcdef, the side pattern ghijklm is divided as follows. That is, as shown in drawing 2 (B), an exterior angle makes the sides gh and ih which use as an end the peak h which is 90 degrees extend from this end h, sets an intersection with the side jk to p, sets an intersection with the side mk to q, and divides the inner side pattern ghijklm into the 1st rectangle pattern gpkm and the 2nd rectangle pattern ijkq.

[0035] (44) Substitute the number of partitions in Step 43 for n. In the case of drawing 2 (B), it is $n = 2$.

[0036] (45) Perform sizing processing as shown in drawing 5 to the inner side pattern divided into the rectangle pattern.

[0037] (46) Perform sizing processing by the conventional method to an outside side pattern. For example, if sizing processing is performed to the outside side pattern abcd shown in drawing 1, Pattern ABCD will be obtained, and Pattern ABCDEF will be obtained if sizing processing is performed to the outside side pattern abcdef shown in drawing 2 (B).

[0038] (47) Store in the predetermined field of RAM the pattern of the configuration which sampled the inner side pattern which carried out sizing processing from the outside side pattern which carried out sizing processing as a pattern which performed sizing of the amount S of sizing to the original pattern, and whenever this field fills, write the data in a magnetic disk 22.

[0039] In addition, since sizing processing of the rectangle pattern ghqm which makes the peak the point q which is not the peak of the inner side pattern ghijklm will be carried out supposing it divides the inner side pattern ghijklm into the rectangle pattern ghqm and the rectangle pattern ijkq at the above-mentioned step 43, the right sizing cannot be performed. That is, it is necessary to divide like the above-mentioned step 43.

[0040] Next, the detail of the above-mentioned step 45 is explained based on drawing 5.

[0041] (50) Substitute 1 for the discernment variable i of the above-mentioned rectangle pattern which divided the inner side pattern and was obtained.

[0042] (51-53) If the size relation between the side W_i of the i-th rectangle pattern and Length H_i is $W_i \geq H_i$, $H_i/2$ will be substituted for the shorter side half the price L, and if it is $W_i < H_i$, $W_i/2$ will be substituted for the shorter side half the price L.

[0043] (54-56) If it is $L > S$, the amount of sizing will perform sizing processing of -S by the conventional method to the i-th rectangle pattern. For example, if this sizing processing is performed to the rectangle pattern gpkm of drawing 2 (B), the rectangle pattern GPKM will be obtained.

[0044] If it is $L \leq S$, the i-th rectangle pattern will be excepted. For example, the rectangle pattern ijkq shown in drawing 2 (B) is $L \leq S$, is excepted and disappears. Condition $L \leq S$ means that a straight line eE and a straight line fF cross in drawing 1. It is a point corresponding to the points e and f of the pattern after Points E and F perform sizing processing of amount of sizing-S here to the inner side pattern efgh.

[0045] (57) If it is $i < n$, it will progress to Step 58, and if it is $i = n$, it will progress to Step 59.

[0046] (58) Increment i and return to the above-mentioned step 51.

[0047] (59) When $n = 1$, i.e., an inner side pattern, is a rectangle pattern, the sizing processing to one inner side pattern is ended, and if it is $n > 1$, it will progress to the following step 60.

[0048] (60) Obtain one inner side pattern by which sizing processing was carried out correctly by performing figure OR operation between the 1st by which sizing processing was carried out - n rectangle pattern, and carrying out pattern composition.

[0049] When sizing processing is carried out by the conventional method shown in drawing 8 to an omission pattern while it was shown in drawing 2 (A), it must extract, a pattern must be divided into six rectangle patterns, and sizing processing must be carried out to each. On the other hand, what is necessary is to divide an inner side pattern into two rectangle patterns, and just to perform sizing processing to a total of three patterns of this rectangle pattern and an outside side pattern in this example, since only an inner side pattern is divided into a rectangle pattern. Moreover, when the rectangle pattern which divided and obtained the inner side pattern disappears by sizing processing according to this example, processing becomes easy like the above-mentioned steps 51-56.

[0050] Therefore, according to this example, the former becomes easy [sizing processing] as a whole, and the processing time can be shortened conventionally.

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CLAIMS

[Claim(s)]

[Claim 1] As opposed to the original pattern of the configuration which sampled the inner side pattern from the outside side pattern contained in mask pattern CAD data (40), When the amount S of sizing that only width of face S fattens this original pattern performs positive sizing processing to the outside of the outside side, and the inside of the inner side and a 90-degree exterior angle is in this inner side pattern, An exterior angle makes the side which uses as an end the peak which is 90 degrees extend from this end, and divides this inner side pattern into the 1st - the n-th rectangle pattern (41-44). about this inner side pattern that is each of the this 1st-n-th rectangle pattern, or a rectangle pattern When the half the price L of a shorter side (51-53) is below the amount S of sizing, this rectangle pattern is excepted (54 56). The half the price L of a shorter side receives this rectangle pattern, in being larger than the amount S of sizing. The amount of sizing that only width of face S dwindles this rectangle pattern performs sizing processing of -S to the neighboring inside (54 55). The figure OR between these 1st-n-th rectangle patterns by which sizing processing was carried out when a 90-degree exterior angle was in this inner side pattern It considers as the inner side pattern by which sizing processing was carried out (59 60), and sizing processing of the amount S of sizing is performed to the side pattern outside this. (46), (47) which uses the pattern of the configuration which sampled this inner side pattern by which sizing processing was carried out from the side pattern outside this by which sizing processing was carried out as the pattern which performed sizing processing of the amount S of sizing to this original pattern, the sizing art characterized by things.

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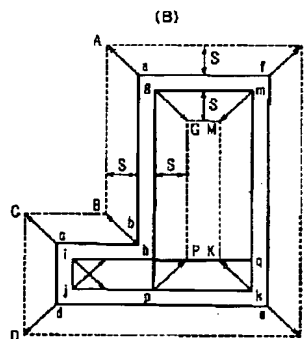
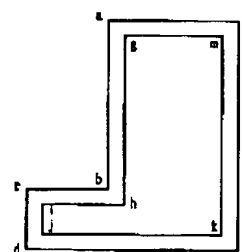
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H01L 21/82(21) Application number: **04138248**(22) Date of filing: **29.05.92**(71) Applicant: **FUJITSU LTD**(72) Inventor: **HAGINO ICHIRO**
AKUTAGAWA SATORU
TAWARA KATSUJI(54) **SIZING PROCESS METHOD**COPYRIGHT: (C)1993,JPO&Japio
(A)

(57) Abstract:

PURPOSE: To perform a correct sizing process in a shorter time.

CONSTITUTION: When the correct sizing process is performed, sides gh and ih having a vertex (h) of 90° in external angle at one end are extended from the one end (h), an internal side pattern ghijkm is divided into a rectangular pattern gpkm and a rectangular pattern ijkq, and the rectangular pattern ijkq whose short-side half value L is less than a sizing quantity S is excluded; and the sizing process whose sizing quantity is -S is performed for the rectangular pattern qpkm whose short-side half value L is larger than the sizing quantity S to obtain a rectangular pattern GPKM, and graphic OR GPKM between the rectangular patterns after the sizing process is regarded as an internal side pattern after the sizing process. Only the internal side pattern is divided into the rectangular patterns and the sizing process is only performed for the rectangular patterns and an external side pattern; and the process when the rectangular patterns disappear by the sizing process, is simplified.



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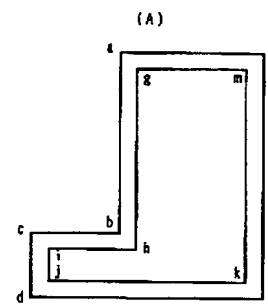
(54)【発明の名称】 サイジング処理方法

(57)【要約】

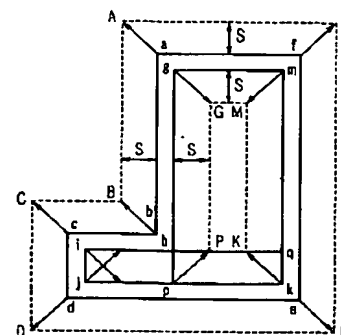
【目的】正しいサイジング処理をより短時間で行う。

【構成】正のサイジング処理を行う場合に、外角が90°の頂点hを一端とする辺gh及び辺ihを該一端hから延長させて、内辺パターンghijklmを矩形パターンgpkmと矩形パターンijkqとに分割し、短辺の半値Lがサイジング量S以下である矩形パターンijkqを除外し、短辺の半値Lがサイジング量Sより大きい矩形パターンqpkmに対しサイジング量が-Sのサイジング処理を行って矩形パターンGPKMを得、サイジング処理された矩形パターン間の図形論理和GPKMを、サイジング処理された内辺パターンとする。内辺パターンのみを矩形パターンに分割し、この矩形パターンと外辺パターンとに対しサイジング処理を行えばよく、また、この矩形パターンがサイジング処理により消滅する場合の処理が簡単となる。

本発明のサイジング処理方法



(B)



【特許請求の範囲】

【請求項1】 マスクパターンCADデータに含まれている、外辺パターンから内辺パターンを抜き取った形状の原パターンに対し（40）、外辺の外側及び内辺の内側へ幅Sだけ該原パターンを太らせるという、サイジング量Sが正のサイジング処理を行う場合に、該内辺パターンに90°の外角があるとき、外角が90°の頂点を一端とする辺を該一端から延長させて該内辺パターンを第1～第n矩形パターンに分割し（41～44）、該第1～第n矩形パターンの各々又は矩形パターンである該内辺パターンについて、短辺の半値L（51～53）がサイジング量S以下である場合には該矩形パターンを除外し（54、56）、短辺の半値Lがサイジング量Sより大きい場合には該矩形パターンに対し、辺の内側へ幅Sだけ該矩形パターンを細らせるという、サイジング量が－Sのサイジング処理を行い（54、55）、該内辺パターンに90°の外角があるときにはサイジング処理された該第1～第n矩形パターン間の図形論理和を、サイジング処理された内辺パターンとし（59、60）、該外辺パターンに対しサイジング量Sのサイジング処理を行い（46）、サイジング処理された該外辺パターンから、サイジング処理された該内辺パターンを抜き取った形状のパターンを、該原パターンに対しサイジング量Sのサイジング処理を行ったパターンとする（47）、ことを特徴とするサイジング処理方法。

【発明の詳細な説明】

【0001】

【産業上の利用分野】 本発明は、アートワークにおいて行われる、マスクパターンCADデータに対するサイジング処理方法に関する。

【0002】

【従来の技術】 マスクパターンのCADデータに対するサイジング処理は、原パターンが図7（A1）に示すような矩形パターンabcdでサイジング量Sが正の場合、（B1）に示す如く、各辺AB、BC、CD及びDAを外側にサイジング量Sだけ平行移動させ、かつ、各辺の両端をサイジング量Sだけ延長させることにより行われる。このサイジング処理により、中心を移動させずに太らせた矩形パターンABCDが得られる。

【0003】 また、図7（A2）のように、原パターンが内抜き矩形パターンである場合、すなわち、外辺パターンabcdから内辺パターンefghを抜き取った形状のパターンである場合で、サイジング量Sが正のとき、外辺パターンabcdに対しては上記処理を行って外辺パターンABCDが得られ、内辺パターンefghに対してはサイジング量が－Sのときの上記同様の処理を行って内辺パターンEFGHが得られる。

【0004】 しかし、半導体集積回路の高集積化に伴い、パターンが微細化し、例えば図7（A3）の原パターンに対し（B3）に示すように上記サイジング処理を行うと、本来消滅すべき内辺パターンefghが内辺パターンGHEFとして現れる。

【0005】 このような誤処理を避けるために、従来では図8（A）に示すように、（1）原パターンを内抜きの4つの矩形パターンaimd、jbck、ijfe及びhgkmに分割し、（2）分割された各矩形パターンに対し上記サイジング処理を行って、（B）に示すような4つの矩形パターンAI1MD、J1BCK1、I2J2FE及びHGK2H2を得、（3）これらの矩形パターンに対し図形論理和演算を行って（C）に示すような内抜きパターンの消滅した矩形パターンABCDを得ていた。

【0006】 このようにすれば、内抜きパターンに対しても正しいサイジング処理を行うことができる。

【0007】 なお、図8（B）では、混同を避けるため各矩形パターンの辺が重ならないように、各矩形パターンを互いに少しずらして表している。

【0008】

【発明が解決しようとする課題】 しかし、サイジング処理対象の原パターン数が膨大である上に、内抜きパターンの分割によりサイジング処理対象のパターン数が大幅に増加するため、サイジング処理の長時間化が著しくなる。これを避けるため、図7（B3）に示すようなサイジング処理を行うと、好ましくないパターンが得られる。

【0009】 本発明の目的は、このような問題点を鑑み、正しいサイジング処理をより短時間で行うことができるサイジング処理方法を提供することにある。

【0010】

【課題を解決するための手段及びその作用】 図1及び図2は、本発明に係るサイジング処理方法の説明図である。

【0011】 このサイジング処理方法は、マスクパターンCADデータに含まれている、外辺パターンから内辺パターンを抜き取った形状の原パターンに対し、外辺の外側及び内辺の内側へ幅Sだけ該原パターンを太らせるという、サイジング量Sが正のサイジング処理を行う場合に、以下のような処理（1）～（5）を行う。この原パターンは、例えば図1（A）に示すような外辺パターンabcdから内辺パターンefghを抜き取った形状のパターン、又は、図2（A）に示すような外辺パターンabcdeから内辺パターンghijklmを抜き取った形状のパターンである。

【0012】 （1）該内辺パターンに90°の外角があるとき、外角が90°の頂点を一端とする辺を該一端から延長させて該内辺パターンを第1～第n矩形パターンに分割する。

【0013】例えば原パターンが図2(A)の場合には、図2(B)に示す如く、外角が 90° の頂点hを一端とする辺gh及び辺ihを該一端hから延長させて内辺パターンghijkmを第1矩形パターンgpkmと第2矩形パターンijkqとに分割する。

【0014】(2)該第1～第n矩形パターンの各々又は矩形パターンである該内辺パターン、例えば図1の内辺パターンefghについて、短辺の半値Lがサイジング量S以下である場合には該矩形パターンを除外し、短辺の半値Lがサイジング量Sより大きい場合には該矩形パターンに対し、辺の内側へ幅Sだけ該矩形パターンを細らせるという、サイジング量が-Sのサイジング処理を行う。

【0015】例えば図2(B)において、短辺の半値Lがサイジング量S以下である第2矩形パターンijkqを除外し、短辺の半値Lがサイジング量Sより大きい第1矩形パターンqpkmに対しサイジング量が-Sのサイジング処理を行って、矩形パターンGPKMを得る。

【0016】(3)該内辺パターンに 90° の外角があるときにはサイジング処理された該第1～第n矩形パターン間の図形論理和を、サイジング処理された内辺パターンとする。

【0017】例えば図2(B)では、パターンGPKMを、サイジング処理された内辺パターンとする。

【0018】(4)該外辺パターンに対しサイジング量Sのサイジング処理を行う。

【0019】例えば図2(B)では、外辺パターンabcdefに対しサイジング量Sのサイジング処理を行うことにより、パターンABCDEFGFが得られる。

【0020】(5)サイジング処理された該外辺パターンから、サイジング処理された該内辺パターンを抜き取った形状のパターンを、該原パターンに対しサイジング量Sのサイジング処理を行ったパターンとする。

【0021】例えば図2(A)の原パターンに対しサイジング量Sのサイジング処理を行ったパターンは、図2(B)の点線で示すパターンとなる。

【0022】本発明では、内辺パターンのみを矩形パターンに分割し、この矩形パターンと外辺パターンとに対しサイジング処理を行えばよく、また、この矩形パターンがサイジング処理により消滅する場合の処理が簡単となるので、正しいサイジング処理をより短時間で行うことができる。

【0023】

【実施例】以下、図面に基づいて本発明の一実施例を説明する。

【0024】図6は、アートワーク処理装置のハードウェア概略構成を示す。この装置は、コンピュータ10に磁気テープ11、21及び磁気ディスク12、22が接続されている。磁気テープ11には、マスクパターンのCADデータが記録されている。

【0025】次に、コンピュータ10によるアートワーク処理を図3～図5に基づいて説明する。以下、括弧内の数値は、図中のステップ識別番号を表す。

【0026】(30)コンピュータ10は、処理の高速化のために、磁気テープ11から処理対象のマスクパターンCADデータを読み出し、これを磁気ディスク12に書き込む。

【0027】(31)S≠0であれば次のステップ32へ進み、S=0であればステップ33へ進む。

【0028】(32)コンピュータ10は、磁気ディスク12に書き込まれているマスクパターンCADデータの全パターンに対し、図4に示すようなサイジング処理を行い、その結果を磁気ディスク22に書き込む。

【0029】(33)磁気ディスク22に書き込まれたマスクパターンデータを露光装置用及び検査装置用のフォーマットに変換し、これを磁気テープ21に書き込む。

【0030】次に、上記ステップ32で行われる、1個のパターンに対する正のサイジング処理(S>0)の詳細を図4に基づいて説明する。負のサイジング処理(S<0)は従来と同一である。

【0031】(40)サイジング対象の原パターンが内抜きパターンであるかどうか、すなわち、パターンに内辺、例えば図1に示すような内辺efghがあるかどうかを判断する。内辺があれば次のステップ41へ進み、なければステップ46へ進む。

【0032】(41)内辺数が4であれば次のステップ42へ進み、4より大きければステップ43へ進む。内辺パターンの内角が全て 90° の場合には内辺数が4となるので、内辺数が4であるかどうかは、内角が 90° 以外のものがあるかどうか、換言すれば、 90° の外角があるかどうかで判断することができる。

【0033】(42)内辺で囲まれるパターン(内辺パターン)の分割数nに1を代入し、ステップ45へ進む。

【0034】(43)内辺パターンを第1～n矩形パターンに分割する。例えば、原パターンが図2(A)に示すように、外辺パターンabcdefから内辺パターンghijkmが抜き取られた形状である場合、この内辺パターンghijkmを次のように分割する。すなわち、図2(B)に示すように、外角が 90° の頂点hを一端とする辺gh及びihを該一端hから延長させ、辺jkとの交点をpとし、辺mkとの交点をqとし、内辺パターンghijkmを第1矩形パターンgpkmと第2矩形パターンijkqとに分割する。

【0035】(44)ステップ43での分割数をnに代入する。図2(B)の場合はn=2である。

【0036】(45)矩形パターンに分割された内辺パターンに対し、図5に示すようなサイジング処理を行う。

【0037】(46) 外辺パターンに対し、従来法によりサイジング処理を行う。例えば図1に示す外辺パターンabcdに対しサイジング処理を行うと、パターンABCDが得られ、図2(B)に示す外辺パターンabcdefに対しサイジング処理を行うと、パターンABCDEFが得られる。

【0038】(47) サイジング処理した外辺パターンから、サイジング処理した内辺パターンを抜き取った形状のパターンを、原パターンに対しサイジング量Sのサイジングを行ったパターンとして、RAMの所定領域に格納し、該領域が満杯になる毎にそのデータを磁気ディスク22に書き込む。

【0039】なお、上記ステップ43で仮に、内辺パターンghijkmを矩形パターンghqmと矩形パターンijkqとに分割したとすると、内辺パターンghijkmの頂点ではない点qを頂点とする矩形パターンghqmがサイジング処理されるので、正しいサイジングを行うことができない。すなわち、上記ステップ43のように分割する必要がある。

【0040】次に、上記ステップ45の詳細を、図5に基づいて説明する。

【0041】(50) 内辺パターンを分割して得られた上記矩形パターンの識別変数iに1を代入する。

【0042】(51~53) 第i矩形パターンの横Wiと縦Hiの大小関係が $Wi \geq Hi$ であれば $Hi/2$ を短辺半値Lに代入し、 $Wi < Hi$ であれば、 $Wi/2$ を短辺半値Lに代入する。

【0043】(54~56) $L > S$ であれば、第i矩形パターンに対し従来法によりサイジング量が-Sのサイジング処理を行う。例えば図2(B)の矩形パターンgpkmに対しこのサイジング処理を行うと、矩形パターンGPKMが得られる。

【0044】 $L \leq S$ であれば、第i矩形パターンを除外する。例えば図2(B)に示す矩形パターンijkqは、 $L \geq S$ であり、除外されて消滅する。条件 $L \leq S$ は、図1において、直線eEと直線fFが交わることを意味する。ここに点E及びFは、内辺パターンefghに対しサイジング量-Sのサイジング処理を行った後のパターンの、点e及びfに対応する点である。

【0045】(57) $i < n$ であれば、ステップ58へ進み、 $i = n$ であればステップ59へ進む。

【0046】(58) iをインクリメントし、上記ステップ51へ戻る。

【0047】(59) $n = 1$ 、すなわち、内辺パターンが矩形パターンである場合には、1個の内辺パターンに対するサイジング処理を終了し、 $n > 1$ であれば、次の

ステップ60へ進む。

【0048】(60) サイジング処理された第1~n矩形パターン間の図形論理和演算を行ってパターン合成することにより、正しくサイジング処理された1個の内辺パターンを得る。

【0049】図2(A)に示す内抜きパターンに対し、図8に示す従来法でサイジング処理した場合には、この内抜きパターンを6個の矩形パターンに分割して各々に対しサイジング処理しなければならない。これに対し、本実施例では内辺パターンのみを矩形パターンに分割するので、内辺パターンを2個の矩形パターンに分割し、この矩形パターンと外辺パターンとの合計3個のパターンに対しサイジング処理を行えばよい。また、本実施例によれば、内辺パターンを分割して得た矩形パターンがサイジング処理により消滅する場合、上記ステップ51~56のように処理が簡単となる。

【0050】したがって、本実施例によれば、全体としてサイジング処理が従来よりも簡単となり、かつ、処理時間を従来よりも短縮することができる。

【0051】

【発明の効果】以上説明した如く、本発明に係るサイジング処理方法によれば、内辺パターンのみを矩形パターンに分割し、この矩形パターンと外辺パターンとに対しサイジング処理を行えばよく、また、この矩形パターンがサイジング処理により消滅する場合の処理が簡単となるので、正しいサイジング処理をより短時間で行うことができるという優れた効果を奏する。

【図面の簡単な説明】

【図1】本発明のサイジング処理方法説明図である。

【図2】本発明のサイジング処理方法説明図である。

【図3】サイジング処理手順を示すジェネラルフローチャートである。

【図4】図3のステップ32での1個パターンに対するサイジング処理の詳細を示すフローチャートである。

【図5】図4のステップ45の詳細を示すフローチャートである。

【図6】アートワーク処理装置のハードウェア概略構成図である。

【図7】従来のサイジング処理説明図である。

【図8】従来のサイジング処理説明図である。

【符号の説明】

10 コンピュータ

11、21 磁気テープ

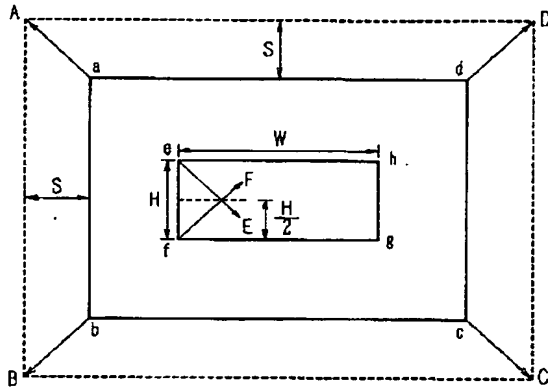
12、22 磁気ディスク

S サイジング量

L 短辺半値

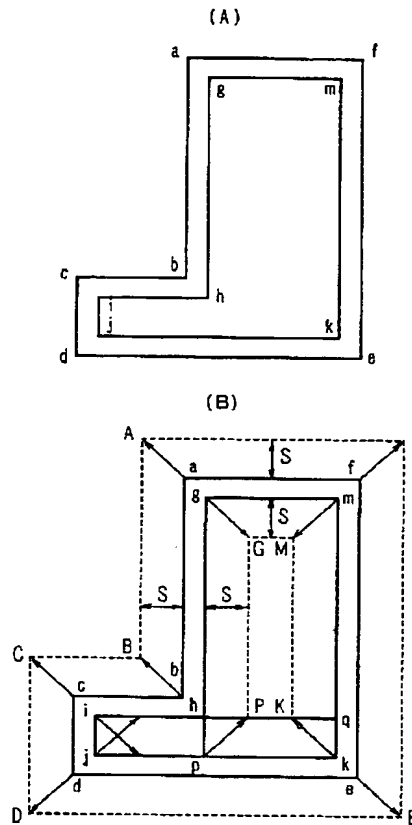
【図1】

本発明のサイジング処理方法



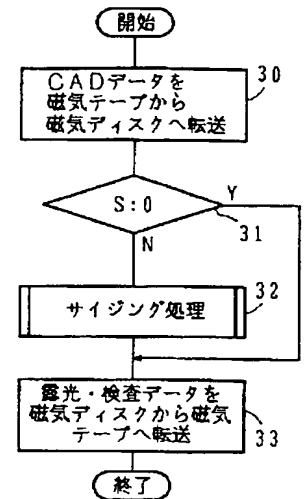
【図2】

本発明のサイジング処理方法



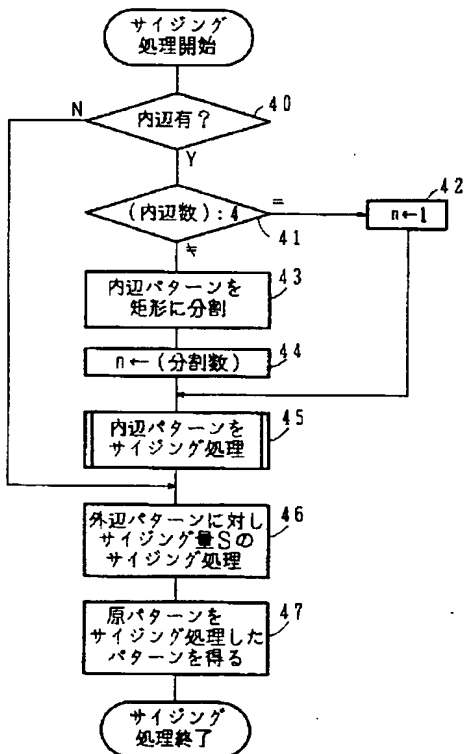
【図3】

サイジング処理手順



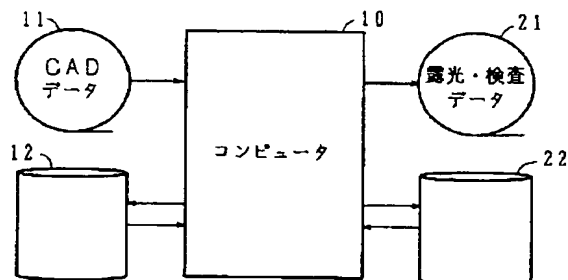
【図4】

図3のステップ32での1個のパターンに対する正のサイジング処理の詳細



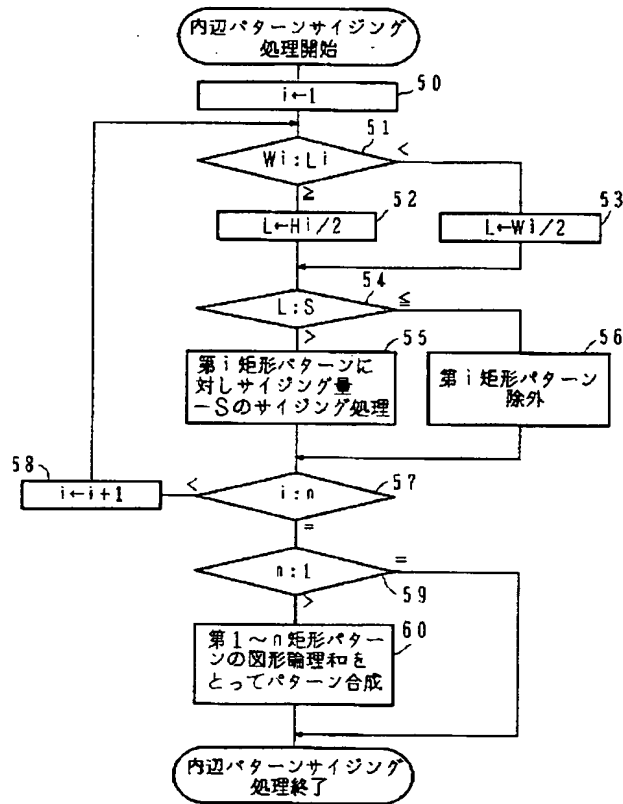
【図6】

アートワーク処理装置



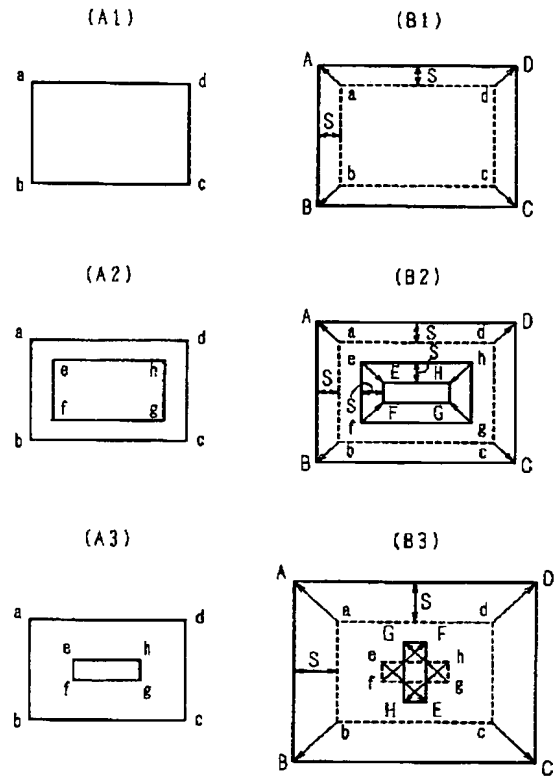
【図 5】

図 4 のステップ 45 の詳細



【図 7】

従来のサイジング処理



【図 8】

従来のサイジング処理

